



Case Study:

Using Nuclide Mixtures in Nucleonica

Raymond Dreher

Nucleonica GmbH



Nuclide Mixtures:

- Why mixtures ?
 - Mixture vs. simple nuclide
 - in the real life: mainly mixtures
 - Mixture vs. Compound
 - Nuclear properties are independent from chemical bonds
- Often used module in other applications

Go to Nuclide Mixtures

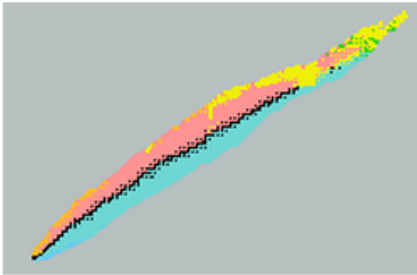


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Applications Data Knowledge My Preferences Help New Browser

► Nuclide Explorer



» Actual Chart: Karlsruhe

► Search Nucleonica Documentation

Nuclear Data Retrieval

► Application Centre

- » Mass Activity Calculator
- » Decay Engine
- » Dosimetry & Shielding
- » Range & Stopping Power
- » In Silico Dosimetry
- » webKORIGEN
- » Decay Engine for Large Nuclide Sets
- » Universal Nuclide Chart
- » Transport & Packaging
- » Nuclide mixtures**
- » Nucleonica Scripting
- » Radiological Dispersion Module
- » Gamma Spectrum Generator
- » Gamma Spectrum Generator Pro
- » Photon Interaction with Matter
- » easy Monte Carlo
- » Cambio file Converter
- » WESPA
- » Gamma Library
- » webGraph

► My Last Nuclides

- 27 Co60 m
- 27 Co60
- 19 K40
- 6 C14
- 38 Sr90

► My Nuclide Mixtures

- Reactor Grade Pu Sample
- webKorigen nuclides 2
- webKorigen nuclides 1
- Natural Uranium**
- HEU, highly enriched uranium


► My Sources

- Pu241 with daughters
- Pu241- 15mg - 8y old - solid, non-special form
- Uranium metal
- Uranium.xml
- Pu239 1 g

nucleonica [wiki]


Nuclide mixtures: User Interface...





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Nuclide Mixtures

[Getting started](#)
[Reference manual](#)

My Mixtures Edit Upload Sample Mixtures

User defined nuclide mixtures

ID	Mixture	Date modified ▼	Download	Delete
	<i>(create, upload a new Mixture)</i>			
8500	Vincenzo@KIT	03.02.2011, 12:47:50		
8486	Uranium Ore	02.02.2011, 14:11:34		
8485	Decay of 100 Grams of 92 U 238 after 4.46808e+10 Years(0.01)	02.02.2011, 14:10:47		
7930	Rb-81/Kr-81m Generator	06.01.2011, 17:11:10		
7522	1 ton Spent Fuel with thorium	07.12.2010, 09:48:16		
5739	isobar mass number 99	11.09.2010, 16:47:35		
4477	Natural Uranium	08.04.2010, 15:50:06		
4474	Pu-Be 2007 six isotopes	20.03.2010, 07:51:56		
4478	Transuranics in 1 ton Spent Fuel	10.03.2010, 14:31:18		
4479	U232+Co60	10.03.2010, 13:50:08		
4476	Natural Thorium	10.03.2010, 13:36:26		
4475	Cs137 + Ba137m	10.03.2010, 13:31:00		
All Mixtures (12)				

Create a new nuclide mixture....



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Nuclide Mixtures

Getting started
Reference manual

My Mixtures Edit Upload Sample Mixtures

Name
enter the name of the mixture

Description:
give a short description of the mixture

Nuclide ▲	Activity(Bq)	Mass(g)	Number of Atoms	Mass ratio	Mole ratio	Activity ratio	Delete
<i>(add a new Nuclide)</i>							
63 Eu 152	7.000e+6	1.087e-6	4.310e+15	0.4079	0.3785	0.5385	🗑
55 Cs 137	5.000e+6	1.555e-6	6.838e+15	0.5832	0.6005	0.3846	🗑
27 Co 60	1.000e+6	2.388e-8	2.400e+14	8.959e-3	0.02107	0.07692	🗑
Total: 3	1.300e+7	2.666e-6	1.139e+16	1	1	1	🗑

Significant figures: 4 ▼

Element Mass Quantity Unit

Ga 82 1 Gram ▼ Update

Save Mixture Reset Cancel Save as Sample

Gram
Becquerel
Curie
Number of Atoms
Mole



Nuclide Mixtures

Example: natural uranium

My Mixtures Edit Upload Sample Mixtures

Name

Description:

Nuclide ▲	Activity(Bq)	Mass(g)	Mass ratio	Mole ratio	Activity ratio	Delete
<i>(add a new Nuclide)</i>						
92 U 234	2.907e+6	0.01264	5.310e-5	5.400e-5	0.4860	
92 U 235	1.354e+5	1.693	7.114e-3	7.204e-3	0.02264	
92 U 238	2.939e+6	236.3	0.9928	0.9927	0.4913	
Total: 3	5.981e+6	238.0	1.000	1	1	

Significant figures:

Nuclide Mixtures: Pre-defined Mixtures



My Mixtures Edit Upload **Sample Mixtures**

Select	Sample Mixture Name	Date Modified
<input checked="" type="checkbox"/>	Cs137 + Ba137m	10.03.2010, 13:31:00
<input checked="" type="checkbox"/>	Natural Thorium	10.03.2010, 13:36:26
<input checked="" type="checkbox"/>	Natural Uranium	08.04.2010, 15:50:06
<input checked="" type="checkbox"/>	Transuranics in 1 ton Spent Fuel	10.03.2010, 14:31:18
<input checked="" type="checkbox"/>	U232+Co60	10.03.2010, 13:50:08


Send to My Mixtures

Create a new mixture:

Details



1. In Edit, enter a **name** for the mixture
2. Enter short description
3. Enter components → „(add a new nuclide)“
 - Choose a nuclide
 - Select a unit
 - Enter the quantity
 - Update grid
4. Save the mixture



Nuclide Mixtures

[Getting started](#)
[Reference manual](#)

My Mixtures | **Edit** | Upload | Sample Mixtures

Name

Description:

Significant figures:

Nuclide ▲	Activity(Bq)	Mass(g)	Number of Atoms	Mass ratio	Mole ratio	Activity ratio	Delete
(add a new Nuclide)							
Total: 0	0	0	0	0	0	0	

Element | Mass | Quantity | Unit

| | |

Update

Create a new mixture:

Details



My Mixtures Edit Upload Sample Mixtures

Name

my highly enriched uranium, HEU

Description:

isotopic composition: 0.77% U-234, 90.20% U-235, 0.33% U-236 and 8.7% U-238.

Nuclide	Activity(Bq)	Mass(g)	Number of Atoms	Mass ratio	Mole ratio	Activity ratio	Delete
<i>(add a new Nuclide)</i>							
92 U 238	4.277e-17	3.439e-21	8.700	0.08802	0.087	5.940e-4	
92 U 236	3.058e-16	1.293e-22	0.33	3.310e-3	3.300e-3	4.248e-3	
92 U 235	2.815e-15	3.521e-20	90.20	0.9010	0.902	0.03910	
92 U 234	6.883e-14	2.992e-22	0.7700	7.659e-3	7.700e-3	0.9561	
Total: 4	7.200e-14	3.907e-20	100.0	1	1	1	

Significant figures:

Element

Mass

Quantity

Unit

Gram

Update

Save Mixture

Reset

Cancel

Create a new mixture: Save & Download mixture



My Mixtures Edit Upload Sample Mixtures

Name
my highly enriched uranium, HEU

Description:
isotopic composition: 0.77% U-234, 90.20% U-235, (





Nuclide ▲	Activity(Bq)	Mass(g)	Number of Atoms
(add a new Nuclide)			
92 U 234	1.762e+6	7.659e-3	1.971e+19
92 U 235	7.205e+4	0.9010	2.309e+21
92 U 236	7.827e+3	3.310e-3	8.446e+18
92 U 238	1.095e+3	0.08802	2.227e+20
Total: 4	1.843e+6	1	2.559e+21

Element Mass Quantity Unit
[] [] 1 [Gra

Save Mixture Reset Cancel

My Mixtures Edit Upload Sample Mixtures

User defined nuclide mixtures

Mixture	Date modified ▼	Download	Delete
(create, upload a new Mixture)			
my highly enriched uranium, HEU	06.05.2011, 14:13:37		
HEU, highly enriched uranium	06.05.2011, 13:32:54		
My Uranium			
My U232+Co60 Mixture			
Natural Uranium			
Decay of 1 Grams of 3			
U232+Co60			
Transuranics in 1 ton			
Natural Thorium			
Cs137 + Ba137m			
All Mixtures (10)			

File Download

Save As

Save in: Mixtures

- Mixture_my highly enriched uranium, HEU.xml
- Mixture_Natural Uranium.xml
- Mixture_UO2 six.xml
- Mixture_UO2 with 3 oxygen isotopes.xml
- Mixtures_All(2).xml
- Mixtures_All(3).xml
- Mixtures_All.xml
- Mixtures_All_rdf.xml

File name: Mixture_my highly enriched uranium, HEU.xml

Save as type: XML Document

Save Cancel